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# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 070/03	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IT 03/00225	International filing date (day/month/year) 11.04.2003	Priority date (day/month/year) 11.04.2002
International Patent Classification (IPC) or both national classification and IPC B28B23/00		
Applicant STONE ITALIA SPA		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 12 sheets.

3. This report contains indications relating to the following items:

- I  Basis of the opinion
- II  Priority
- III  Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV  Lack of unity of invention
- V  Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI  Certain documents cited
- VII  Certain defects in the international application
- VIII  Certain observations on the international application

Date of submission of the demand 23.10.2003	Date of completion of this report 21.06.2004
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer  Fageot, P Telephone No. +31 70 340-2092



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No.

PCT/I/T 03/00225

**I. Basis of the report**

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed"* and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)):

**Description, Pages**

1-9 received on 26.04.2004 with letter of 22.04.2004

**Claims, Numbers**

1-8 received on 26.04.2004 with letter of 22.04.2004

**Drawings, Sheets**

1/1 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.: 9
- the drawings, sheets:

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5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).  
*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*
6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	1-8
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-8

**2. Citations and explanations**

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following document/s:  
D1: IT VR 940 068 A (STONE ITALIANA S R L) 25 October 1994 (1994-10-25)  
D2: US-A-4 640 854 (RADTKE MANFRED) 3 February 1987 (1987-02-03)
2. Independent claim 1  
The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.
  - 2.1 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document): a sheet or tile made from an agglomerate material as well as a procedure for the production of sheets or tiles in agglomerate material consisting of products comprising marble and/or granite and/or sand and/or quartz powders and binding resins, also comprising possible inclusions of elements made from metal, glass, ceramic, wood, precious stones, (*page 3, lines 1-5*) comprising the following processing stages: a) crushing of the components of the sheets or tiles; b) mixing of these components with the aforesaid binding resins; c) pressing and compacting of these components inside a pressing die, and hardening at a predetermined pressure and temperature, in order to obtain a predetermined shape, advantageously quadrangular, and predetermined dimensions of these sheets or tiles (*page 3*).
  - 2.2 The subject-matter of claim 1 therefore differs from this known D1 in that: before stage c) is carried out, a metal plate is positioned inside the pressing die and presents an irregular structure designed to accommodate the mixture of the components which, during the polymerisation and hardening stages, bond to the plate thus forming the base of the sheet or tile.
  - 2.3 The problem to be solved by the present invention may therefore be regarded as designing and producing a lighter plate which in addition to its ability to support the weight of considerable load should also avoid the accumulation of electrostatic charges.

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- 2.4 The solution proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons. Document D2 discloses (the references in parentheses applying to this document) a composite plate for floor covering. The lower part of the plate comprises a metal plate with an irregular structure (col. 3, lines 31-57, fig. 2) and provides the same advantages for a similar application (col. 1, lines 60-63). The skilled person would therefore regard it as a normal design to include this feature in the floor covering tile described in document D1 in order to solve the problem posed.

The subject-matter of claim 1 is therefore not inventive (Article 33(3) PCT).

3. Independent claim 5

The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claim 5, which therefore is also considered not inventive.

4. Dependent claims 2 to 4 and 6 to 8

Dependent claims 2 to 4 and 6 to 8 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, see documents D1 and D2 and the corresponding passages cited in the search report.

5. The subject-matter of claims 1 to 8 is considered as susceptible of industrial application (Article 33(4) PCT).

PROCESS FOR MANUFACTURING REINFORCED TILES OR PANELS OF AGGLOMERATED MATERIAL WITH A METALLIC PLATE AS WELL AS PRODUCT OBTAINED THROUGH SAID PROCESS

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## TECHNICAL FIELD

The present invention concerns a procedure for the production of sheets or tiles made from agglomerate material, in the case in question a material generally consisting of marble and/or quartz and/or sand and/or binding resins and/or granite-based mixtures, also comprising possible intrusions of various kinds, such as elements in metal, glass, wood, etc., these sheets or tiles being equipped with a metal reinforcement plate positioned on the lower surface.

The invention also refers to sheets or tiles manufactured according to this procedure.

20 The invention applies mainly to the industrial processing field of marble, stone, granite and the like.

## BACKGROUND ART

Sheets or tiles in agglomerate material presenting an internal reinforcement structure are frequently used for laying so-called raised or floating floors in which the sheets or tiles are positioned on top of an appropriate wire grid which is raised with respect to the ground thus making it possible to obtain a hollow space with a predetermined height, allowing the laying of large quantities of electrical and/or hydraulic ducting and their easy maintenance or modification.

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While on one hand raised or floating floors present considerable advantages, including those described above, on the other they involve a series of drawbacks which limit their construction and use or make them  
5 difficult.

A first drawback presented by raised or floating floors made from composite material is due to the fact that these floors are usually electrically ground-insulated.

10 This implies an unfavourable accumulation of electrostatic charges on objects which are present on or which move on this floor, an effect which is unacceptable for numerous precision electronic devices but which may be even more simply disadvantageous if  
15 these electrostatic discharges involve the people who walk across the floor.

A further limitation usually involved in the construction of raised or floating floors consists of the fact that the sheets must directly support the  
20 weight of considerable loads and must therefore be fairly thick in order to withstand maximum breaking loads in compliance with safety regulations.

All this inevitably means not only great structural and working limitations but also high costs and lengthy  
25 and difficult laying times for these floors.

The Italian document VR94A000068 describes a procedure for the production of sheets made from agglomerate material comprising a series of processing stages, specifically:

- 30 - an initial stage consisting of the crushing of the various materials making up the agglomerate;

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- a second stage consisting of the mixing of the crushed materials in order to obtain a product which is as homogeneous as possible, during which the binding resins are added;
  - 5 - a third stage consisting of the pressing and compacting of the agglomerate during which the required shape is obtained and in which a wire or fibre mesh is buried, this being formed by a plurality of wires arranged according to a predetermined layout and whose ends are situated at the same level as or protrude beyond the lower surface of the sheet;
  - 10 - a fourth stage in which the sheet is hardened at a predetermined temperature;
  - 15 - a fifth stage in which at least one side of the sheet is smoothed and polished;
  - a sixth stage in which the sheet is cut to size, chamfered, gauged and flared, followed by unloading of the end products.
- 20 A procedure such as the one described above makes it possible to obtain sheets made from agglomerate material, with precisely predetermined lengths, widths and thicknesses, and which is performed in a continuous process on a specially designed plant.
- 25 In spite of the presence of the wire-mesh consisting of wires as described above, the previously mentioned disadvantages are still present, particularly as regards the electrostatic charge.
- In fact, during the hardening stage the resin  
30 envelopes the metal surface of the wires forming the reinforcement mesh, creating an insulation film which

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does not permit effective discharge of the accumulated electrostatic charge.

#### DESCRIPTION OF THE INVENTION

The present invention aims to overcome the above-  
5 mentioned drawbacks and disadvantages, and to therefore provide a procedure which allows the production of sheets or tiles made from agglomerate material designed to be advantageously used in laying floating floors.

This is achieved by implementing the features  
10 described in the main claim.

The dependent claims describe particularly advantageous forms of embodiment of the procedure according to the invention.

Finally, claim 4 describes a sheet or tile made  
15 from agglomerate material advantageously obtained by means of the procedure according to the invention.

According to a fundamental feature of the invention, during the pressing and compacting stage of the procedure for obtaining the sheets a metal plate is  
20 positioned on the lower surface of the sheet. The structure of this plate is the result of the processing of a laminar element, obtained for example by die forming, presenting an irregular structure for example with cavities and protruberances designed to accommodate  
25 the agglomerate mixture which, during the polymerisation and hardening stage, binds to the plate thus forming the base of the sheet or tile.

As far as the other stages of the procedure are concerned, there are no technically significant  
30 variations with respect to what is already known and the end result is a sheet reinforced with a metal plate

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which covers its lower surface to form a single object.

The use of this type of sheet makes it possible to resolve the problems mentioned above, typical of background art.

5       The metal plate which reinforces the lower surface of the sheet or tile makes it sturdier and able to support much higher loads compared to traditional tiles or panels.

This makes it possible to achieve sheets or tiles,  
10 and consequently entire floors, with regulation breaking loads and with extremely reduced thicknesses and weights compared to those present in background art, with lower production costs and less difficulties in laying the floors.

15      When using the sheets or tiles to lay raised or floating floors, the metal reinforcement plates can be connected to each other, thus allowing a continuous and precise ground-discharge of the electrostatic charge generated on the surface of the floor or of the objects  
20 in contact with the floor, preventing the discharges from damaging the equipment or affecting the people walking across the floor.

In fact thanks to the particular structure of the metal plate and its extensive surface, although the  
25 resin contained in the mixture forming the agglomerate binds to the plate during the polymerisation and hardening stage, also due to the presence of elements that make its surface irregular and allow an excellent adherence of the mixture, it does not lead to the  
30 formation of an insulating film as in the solutions known to background art.

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**DESCRIPTION OF THE DRAWINGS**

Other features and advantages of the invention will become evident on reading the following description, given as a non-binding example, with the help of the  
5 enclosed drawings, in which:

- figure 1 a metal plate according to the present invention;
- figure 2 shows a perspective view from above, partially in cross-section, of a sheet or tile according to the present invention; and
- 10 - figure 3 shows a perspective view from below, of the base of the sheet or plate according to figure 2.

**DESCRIPTION OF A FORM OF EMBODIMENT**

15 In the figures, the reference number 10 generally indicates a sheet or tile made from stone agglomerate material, manufactured by means of the procedure according to this invention.

The materials normally used for the production of  
20 sheets or tiles 10 of this type comprise a variety of mixtures such as for example marble of different types or colours bonded by resins, marble bonded with predetermined percentages of quartz, sands bonded with binding resins and various other possibilities widely  
25 known to the background art.

The procedure for manufacturing the sheets or tiles  
10 is typically carried out on an automated plant controlled by a computerised system in the various processing stages.

30 The first stage of the procedure foresees the crushing of the various components in order to achieve

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the required granulometry, particularly when marble, granite or quartz are used.

In the second stage the crushed products are mixed together in a special mixing machine and an appropriate  
5 synthetic resin acting as a binder is added.

In the third stage the mixture is poured into a die of a press. The action of the press on the mixture, together with the activation of a vibrator device and a vacuum device, makes it possible to model a sheet or  
10 tile according to a predetermined shape, thickness and density, and with a homogeneous structure free of gas or air bubbles.

According to the present invention, a metal plate  
11 is positioned on the bottom of the pressing die  
15 before the mixture to be pressed is poured into the die.

Once the pressing and hardening has been carried out, the metal plate 11 constitutes a single object with the sheet or tile 10, forming the lower surface.

The subsequent stages of the procedure are then  
20 carried out in the traditional way.

The sheet or tile 10 is first conveyed inside a kiln in which the polymerisation of the synthetic resin and the consequent hardening of the sheet or tile take place, with particular temperature conditions and  
25 hardening times, well known to experts in the sector.

On leaving the kiln, the sheet or tile 10 is conveyed towards the next processing stations for the subsequent smoothing and polishing of the upper surface, the cutting to size according to the required shape,  
30 the chamfering, gauging and flaring operations, and then to any waxing, drying and packaging stations.

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The above description shows that the procedure according to this invention differs from what is already known to the background art by the insertion of a metal plate during the product pressing stage.

5 This particular solution makes it possible to obtain an end product with completely new features with respect to what is already known.

In fact, the insertion of the plate makes it possible to completely discharge any electrostatic charge accumulated on the sheet or tile by connecting it to ground electrically or by connecting the entire floor once the various sheets or tiles of which it consists are connected to each other as in the case of a floating floor.

15 This particular ability to discharge the electrostatic current is made possible by the presence of the plate and its extensive contact surface with the conductor elements inside the agglomerate structure.

The metal plate 11 according to this invention can 20 be obtained for example from an element die-formed or rolled in such a way as to present a series of cavities or protruberances which allow excellent adherence of the resin to the plate.

In figure 1 these cavities are represented by 25 elements 12 which expand from the bottom of the plate. According to other variations, not shown in the drawings, these cavities can also be knurled or rippled, or protruberances or elements protruding towards the mixture forming the agglomerate.

30 According to a particular embodiment of the invention, the metal plate can be made from aluminium.

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The other considerably important function of the metal plate 11 is to reinforce the sheet or tile 10 giving it a much higher breaking load compared with a sheet of the same size constructed according to known  
5 techniques.

This means that sheets or tiles 10 much thinner than traditional ones but with the same required breaking load can be used to lay a floor.

For example, according to this invention it is  
10 possible to use sheets or tiles with a thickness of between 10 and 20 mm to construct raised or floating floors and with a breaking load which is the same as that of traditional panels, sheets or tiles, which are normally at least 30-35 mm thick.

15 As already mentioned above, the possibility of using thinner sheets or tiles means less material, less weight, easier laying and, basically, a remarkable saving in costs, despite the insertion of the metal plate.

20 The invention is described above with reference to a preferred form of embodiment.

It is nevertheless clear that the invention is not limited to this form of embodiment but is also susceptible to numerous variations with the same aims,  
25 within the framework of technical equivalents.

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## CLAIMS

1. A procedure for the production of sheets or tiles (10) in agglomerate material consisting of products comprising marble and/or granite and/or sand and/or quartz powders and binding resins, also comprising possible inclusions of elements made from metal, glass, ceramic, wood, precious stones, comprising the following processing stages:
  - a) crushing of the components of the sheets or tiles (10);
  - b) mixing of these components with the aforesaid binding resins;
  - c) pressing and compacting of these components inside a pressing die, and hardening at a predetermined pressure and temperature, in order to obtain a predetermined shape, advantageously quadrangular, and predetermined dimensions of these sheets or tiles (10);said procedure being characterised in that before stage c) is carried out a metal plate (11) is positioned inside the pressing die and presents an irregular structure designed to accommodate the mixture of the components which, during the polymerisation and hardening stages, bond to the plate (11) thus forming the base of the sheet or tile (10).
2. A procedure according to claim 1, characterised in that the metal plate (11) is obtained by die-pressing or rolling.
3. A procedure according to any one of the preceding claims, characterised in that it also comprises the

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following additional stages:

- d) smoothing and polishing of at least one of the upper and/or lower surfaces of these sheets or tiles (10);
- 5 e) cutting to size, chamfering, gauging and flaring of these sheets or tiles (10).
- 4. A procedure according to any one of the preceding claims, characterised in that said procedure is achieved by means of an automated plant comprising a series of automatic machines designed to carry out the said processing stages and whose functioning is controlled by a computerised system.
- 10 5. A sheet or tile (10) made from an agglomerate material consisting of products comprising marble and/or granite and/or sand and/or quartz powders and binding resins, also comprising possible inclusions of elements made from metal, glass, ceramic, wood, precious stones, characterised in that the lower part comprises a metal plate (11) presenting an irregular structure designed to accommodate the agglomerate mixture and such as to allow, during the polymerisation and hardening of the mixture, the bonding of the plate which thus forms the base of the sheet.
- 15 20 6. A sheet or tile (10) according to claim 5 characterised in that the metal plate is obtained by die-pressing.
- 25 7. A sheet or tile (10) according to any one of the claims 5 or 6, characterised in that the metal plate is made from aluminium.
- 30 8. A sheet or tile (10) according to any one of the

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claims 5 to 7, characterised in that the base of the metal plate comprises a plurality of cavities (12) and/or of protruberances designed to facilitate the adherence of the mixture to the plate.

- 5
9. The use of a sheet or tile (10) according to any one of the claims 5 to 8 for the laying of raised or floating floors.

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